## REMARKS

Claims 1 to 10 are in the application in which claim 10 stands withdrawn from consideration by the Examiner as being for a non-elected invention, and claims 1 to 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Arnett, et al. in view of Riser, et al. and Savage.

The Office Action has been considered and, pursuant to the remarks made by the Examiner therein, the claims in the application are hereby amended in order to more clearly define what Applicants consider to be their invention, and to better distinguish the claimed invention from the prior art. Specifically, the claims, as amended, define an improved sleeve for arrangement in a connector for optically connecting an optical fiber and a transmitting or receiving module therein. The sleeve, as shown best in Figure 4 of the drawings, comprises a body 1 containing a light leading path 26 of frusto-conical shape having a small diameter end face 29 for facing the concerned module. There is also provided an outer tube portion 28 disposed concentrically with respect to the light leading path 26 and substantially coextensive therewith. The outer tube portion 28 and the periphery of the light-leading path 26 are mutually connected by a peripheral projecting portion 27 which extends radially between, and interconnects, the two members.

Applicants respectfully submit that the rejection of the claims in the application, particularly as now amended, is without merit because the patent to Arnett, et al. discloses no more than a coupler 30 for use in a laser system wherein an adapter flange 36 at an end of the coupler has an axially projecting tube 46 extending from the distal end of the flange. The tube 46 is receivable in the bore 48 of an endoscope 42 and is substantially coextensive therewith. As clearly shown in the reference drawings, the tube 46 and endoscope 40 constitute no more than concentric cylindrical

members and not a sleeve concentrically surrounding a frusto-conical light-leading path as required by the claims of the application.

Moreover, the defects in this reference for serving as an anticipation of the claimed invention are not cured by either of the cited patents to Riser, et al. and Savage. Firstly, Riser et al. in Figure 3 does not show a frusto-conically shaped light-leading path as suggested by the Examiner. What is shown in Figure 3 is a perspective illustration of what the patent states at column 2, lines 64 to 67, is a cylindrical housing which, alternatively, may be rectangular. Nowhere in this patent is there any suggestion that the housing can be frusto-conical.

Finally, the projection 32 of Savage does not extend between, nor does it interconnect an outer tube portion and a light-leading path as does the peripheral projecting portion 27 of the claimed invention. Instead, the member 32 of Savage is no more than a radially projecting end flange for the fiber optic cable 10. (See, column 3, lines 25 to 28 of the patent.)

For the foregoing reasons, it is submitted that claim 1, as well as claims 2 to 9 which depend from claim 1, are distinguishable from the cited reference. The claims are therefore submitted as being patentable over the references and their allowance is respectfully solicited.

If, for any reason, it is believed that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with markings to show changes made

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE 09/893,548**

**IN THE SPECIFICATION:**

The Specification was **AMENDED** as follows:

**The paragraph beginning at page 1, line 10, was replaced with the following rewritten paragraph:**

An optical connector having a sleeve between an optical fiber and a transmitting module and between an optical fiber and a receiving module is disclosed in Japanese Utility [Modes] Model Registration Application Laid-open No.6-33443.

**The paragraph beginning at page 1, line 13, was replaced with the following rewritten paragraph:**

The optical connector has a sleeve having a light-leading path with a constant diameter along an optical axis. Therefore, when a light-receiving surface of the receiving module is smaller than the light-emitting surface of the sleeve, a part of signal light transmitted through the optical fiber [could not] cannot be received by the receiving module, thereby lowering the transmission efficiency.

**The paragraph beginning at page 1, line 17, was replaced with the following rewritten paragraph:**

When a light emitting diode (LED) is used as a transmitting module, the light emitted by the light emitting diode diffuses, and a part of the light emitted by the light emitting diode [could not] cannot enter the light-leading path of the sleeve.

**The paragraph beginning at page 1, line 15, through page 2, line 3 was replaced with the following rewritten paragraph:**

The receptacle 103 has a housing 107 of synthetic resin, transmitting and receiving modules 104 and a pair of sleeves 101. The housing 107 is formed in a box-shape and has a pair of accommodating [cambers] chambers 108 opening in the external wall. And, the housing 107 couples with the optical plug shown in FIG.11.

**The paragraph beginning at page 2, line 4, was replaced with the following rewritten paragraph:**

The transmitting and receiving modules 104 are accommodated in the respective chambers 108. A pair of sleeves 101 are installed in the housing 107. The sleeve 101 has a light-leading path 126 [in a flat-headed conic] of frusto-conical shape [126].

**The paragraph beginning at page 2, line 15, was replaced with the following rewritten paragraph:**

The optical plug has a pair of optical fibers, a pair of ferrules, and the plug housing. The pair of optical fibers are arranged in parallel. Each ferrule covers the optical fiber in a state of the end face of the optical fiber being exposed. The plug housing accommodates the ferrule and couples [with in] within the housing.

**The paragraph beginning at page 3, line 1, was replaced with the following rewritten paragraph:**

With respect to the above prior art optical connector 102, however, since the sleeve 101 is accommodated in the housing 107 in a state that the light-leading path 126 reduces its diameter toward the transmitting or receiving module 104[. Therefore, it would be], it is difficult to secure the sleeve 101 in the housing 107 such that the sleeve 101 can optically connect the optical fibers and the respective transmitting and receiving modules 104.

**The paragraph beginning at page 3, line 7, was replaced with the following rewritten paragraph:**

The above structure requires [not a little man-hour] increased man-hours for its assembly work thereby increasing the cost. And also, since the transmitting and receiving modules 104 can not necessarily be optically secured with the optical fibers, the transmission efficiency of the signal light [would be] is lowered. Further, the sleeve 101 [would slip] slips off to an extent of releasing the optical connection.

**The paragraph beginning at page 3, line 18, through page 4, line 2 was replaced with the following rewritten paragraph:**

In order to achieve the above object, as a first aspect of the present invention, a sleeve arranged between an optical fiber and a transmitting or receiving module for optically connecting the optical fiber and the transmitting or receiving module comprises: a light-leading path being in

a [flat-headed conic] frusto-conical shape having a small-diameter end face facing the transmitting or receiving module; a peripheral projecting portion projecting in a radial direction from another end portion, being on a side of the optical fiber, of the light-leading path; and an outer tube portion extending in an optical axis direction of the light-leading path from a peripheral portion of the peripheral projecting portion toward the small-diameter end face while covering an entire length of the light-leading path.

**The paragraph beginning at page 4, line 7, was replaced with the following rewritten paragraph:**

As a third aspect of the present invention, based on the second aspect, an outside diameter of the outer tube portion is [equally formed] substantially uniform over an entire length of the light-leading path.

**The paragraph beginning at page 4, line 10, was replaced with the following rewritten paragraph:**

As a fourth aspect of the present invention, based on the first aspect, the outer tube portion has a flange projecting [circularly] annularly in a radial direction from a peripheral surface thereof.

**The paragraph beginning at page 6, line 16, was replaced with the following rewritten paragraph:**

(3) Because the outside diameter of the outer tube portion is [formed equally] uniform in a longitudinal direction thereof, the sleeve can be more securely positioned only by accommodating it in the mediating pipe of the housing, thereby improving productivity of the optical connector with the sleeve, reducing the cost thereof, and improving the transmission efficiency of the optical connector with the sleeve.

**The paragraph beginning at page 7, line 2, was replaced with the following rewritten paragraph:**

(6) Because the lens [dose not projects over] does not project beyond the outer tube portion, the lens can be protected by the outer tube portion, thereby facilitating the production management.

**The paragraph beginning at page 8, line 6, was replaced with the following rewritten paragraph:**

FIG.1 is a plan view showing an optical connector having an embodiment of a sleeve in accordance with the present invention;

FIG.2 is a sectional view of the optical connector shown in FIG.1;

FIG.3 is a side view showing an embodiment of the sleeve in accordance with the present invention;

FIG.4 is a sectional view of the sleeve, taken along a line IV-IV in FIG.3;

FIG.5 is [a sectional] an end view of the sleeve, taken from an arrow V in FIG.3;

FIG.6 is [a sectional] an end view of the sleeve, taken from an arrow VI in FIG.3;

FIG.7 is a sectional view showing a state of transmitting the light from an optical fiber to a receiving device through the sleeve shown in FIG.3;

FIG.8 is a sectional view showing a state of transmitting the light from a transmitting device to an optical fiber through the sleeve shown in FIG.3;

FIG.9 is a [scheme] diagram showing a state of transmitting the light shown in FIG.8, which light should be conventionally larger than the critical angle;

FIG.10 is a sectional view showing a part of a metal mold unit used for molding the sleeve shown in FIG.3; and

FIG.11 is an exploded perspective view showing a structure of a prior art optical connector.

**The paragraph beginning at page 9, line 15, was replaced with the following rewritten paragraph:**

The ferrule 15 integrally has a base end portion 15a [remotest] most remote from the above end face 6a of the optical fiber 6, a circular ring portion 15b projecting in a radial direction from the base end portion's end nearer the end face 6a, a middle portion 15c continuing from a face of the circular ring portion 15b and having a diameter smaller than that of the above base end portion 15a, and a front end portion 15d continuing from the end of the middle portion 15c and having a diameter smaller than that of the middle portion 15c.

**The paragraph beginning at page 12, line 3, was replaced with the following rewritten paragraph:**

The sleeve 1 is formed, for example, by the injection molding with synthetic resin such as Polymethylmethacrylate (PMMA), transparent polycarbonate (PC), or Cycloolefin. The sleeve 1, as shown in FIG.3 to FIG.6, integrally has a light-leading path 26 in a [flat-headed conic] frusto-conical shape, a peripheral projecting portion 27, an outer tube portion 28, and a [the] flange 31.

**The paragraph beginning at page 12, line 17, was replaced with the following rewritten paragraph:**

The lens 35 is formed convexly with a defined radius of curvature toward the optical fiber 6 from the end face 32. In the present embodiment, the lens 35 is a spherical one. This lens 35 attains an efficient transmission of the signal light. And, the lens 35 does not project [over] beyond an end face 33b of the outer tube portion 28.

**The paragraph beginning at page 13, line 1, was replaced with the following rewritten paragraph:**

The outer tube portion 28 extends from the peripheral portion of the peripheral projecting portion 27 toward the end face 29. The outer tube portion 28 covers the entire light-leading path 26 along the optical axis P. An end face 33a of the outer tube portion 28 is generally flush with the above end face 29. The outside diameter of the outer tube portion 28 is the same over the entire length thereof. The center line of the outer tube portion 28 [agrees] aligns with the optical axis P.

The light-leading path 26, the peripheral projecting portion 27, and the outer tube portion 28 are formed coaxially.

**The paragraph beginning at page 13, line 10, was replaced with the following rewritten paragraph:**

The flange 31 is circular and projects [circularly in a radial direction] radially from the peripheral surface of the outer tube portion 28. The flange 31 is provided on a generally longitudinal center of the outer tube portion 28 [circularly] coaxially around the optical axis P. The flange 31 is formed coaxially with the light-leading path 26, the peripheral projecting portion 27, and the outer tube portion 28.

**IN THE CLAIMS:**

Claims 1 and 3 through 9 were **AMENDED** as follows:

1. (Amended) A sleeve [arranged] for arrangement in a connector between an optical fiber and a transmitting or receiving module for optically connecting the optical fiber and the transmitting or receiving module, said sleeve comprising:

a body containing a light-leading path [being in flat-headed conic] of frusto-conical shape having a small-diameter end face for facing the transmitting or receiving module;

[a peripheral projecting portion projecting in a radial direction from another end portion, being on a side of the optical fiber, of the light-leading path; and]

an outer tube portion [extending in an optical axis direction of] disposed concentrically with respect to the light-leading path [from a peripheral portion of the peripheral projection portion toward the small-diameter end face while covering an entire length of the light-leading path.] and being substantially coextensive therewith; and

a peripheral projecting portion extending radially between and interconnecting the outer tube portion and the periphery of the light-leading path.

3. (Amended) The sleeve as set forth in claim 2, wherein

an outside diameter of the outer tube portion is [equally formed] substantially uniform over an entire length of the light-leading path.

4. (Amended) The sleeve as set forth in claim 1, wherein

the outer tube portion has a flange projecting [circularly] annularly in a radial direction from a peripheral surface thereof.

5. (Amended) The sleeve as set forth in claim 1, [wherein] including

a convex lens [is] formed integrally with said [another end portion of the] light-leading path [convexly] for extending toward the optical fiber.

6. (Amended) The sleeve as set forth in claim 5, wherein

the lens has an axial length not greater than [does not project over] an optical fiber side end of the outer tube portion.

7. (Amended) The sleeve as set forth in claim 1, wherein

an end face of said [another end portion of the] light-leading path opposite said small diameter end face is a light-receiving surface [to receive] for receiving light transmitted by [the] an optical fiber, and

a diameter of the light-receiving surface is larger than a diameter of a light-emitting surface [being] at an end face of [the] an optical fiber.

8. The sleeve as set forth in claim 1, wherein

the small-diameter end face of the light-leading path is a light-emitting surface to emit light

transmitted to [the] a receiving module, and

a diameter of the light-emitting surface is smaller than a diameter of a light-receiving surface of the receiving module.

9. (Amended) The sleeve as set forth in any one of claims 1-6, wherein

the small-diameter end face of the light-leading path is a light-receiving surface [to receive] for receiving light transmitted from [the] a transmitting module, and

a diameter of the light-receiving surface is larger than a diameter of a light-emitting surface to the transmitting module.